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June 20, 1996

Mr. William F. Caton, Acting Secretary
**Federal Communications Commission**
1919 M Street, N.W.
Washington, D.C. 20554

DOCKET FILE COPY ORIGINAL

Ref: MM Docket 96-62

Dear Mr. Caton,

Enclosed herein please find one original plus five copies of comments pertaining to MM Docket 96-62. Questions concerning these comments may be addressed directly to the undersigned.

Respectfully,

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# MM DOCKET 96-62

## June, 1996

**Comments of Thomas G. Osenkowsky**

Before the
Federal Communications Commission

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In the Matter of:

MM Docket 96-62

The Commission has proposed to address certain aspects of blanketing interference from broadcast facilities. For AM broadcast stations, the blanketing zone is defined as the 1 v/m contour. The methodology proposed by the Commission is more complex for AM directional stations than that already is use for calculating the blanketing zone for FM broadcast stations. This writer takes exception to the proposed (consolidated) AM blanketing rule §73.1630(a).

The proposed §73.1630(a) method for determining the 1 v/m contour is self-contradictory. The method calls for "actual field strength measurement or iterative vector summation...". The most widely used field *intensity* meters employed today are manufactured by Potomac Instruments, Nems-Clark, RCA (manufactured by Nems-Clark) and Delta Electronics. All of these meters employ shielded loop antennas which inherently have a directional receiving pattern. One can easily imagine the difficulty in obtaining an accurate (total vector sum) field intensity measurement from an array of towers oriented in a North-South line with a measuring location on an East-West bearing. The field *intensity* meter can best be described as a magnetic field measuring instrument. It is most unlike an automobile receiver with a virtually omnidirectional, unshielded receiving antenna. The Commission is proposing to take into account array geometry in calculations while ignoring the directional and magnetic characteristics of the measuring instrument.

The virtues of relating field intensity measurements to far field point source assumptions such as those used in the Commission's allocation formulas (CFR FCC §73.150) constitute an art for all but the simplest arrays. Over the years, at least six different methods of *proximity correction* have been employed in the analysis of directional antenna proofs of performance. The simplest of these formulas is contained in the NEAR routine of the Commission's RADIAT directional antenna computer program and is the proposed method for determination of the 1 v/m contour.

The NEAR routine performs a simple manipulation of the far field vector summation process, taking into account the array's horizontal geometry considering a (relatively) distant monitoring location. NEAR does not, however, consider the radiator magnetic or induction field thus ignoring the tower height. An improved method is suggested by Jordan & Balmain [1] which does consider the induction field. This solution was first suggested by Brown [2] and later related to field intensity measurement corrections by Silliman, Moffet and Rohrer [3]. The aforementioned calculations assume sinusoidal current distribution on each of the array elements as they radiate over a perfect ground plane. Other methods of proximity correction deal with correcting measured data in deep suppression zones and are not particularly relevant to this proceeding and therefore will not be presented for further discussion.

The proposed section §73.1630(a) calls for the field phase to be taken at the tower's *current loop*. Customarily, the current loop is assumed to be located 90° down from the top of the tower with the phase distribution along the tower assumed to be constant. Conventional wisdom suggests otherwise. The location of the current loop (point of maximum current) on a tower is a complex function of the array's physical characteristics as well as its driving parameters. Thus, the current loop can change position given different modes of operation i.e. a DA-2. A current sample loop even under conditions of equal length sample lines may not precisely depict the loop current real and imaginary components under different driving conditions. The loop and field values are *not* synonymous.

The Commission could opt to incorporate the Jordan/Balmain formulae into the proposed §73.1630(a) using the sinusoidal assumption and the array's theoretical field operating parameters. The mathematics employed in these calculations are necessarily more complex than the simple geometric approach proposed in the new section. There is, however, a more precise and advantageous method. The Commission has previously addressed the issue of the validity of directional antenna proofs of performance in MM Docket 93-177. In that proceeding, the Commission addressed the concerns of several petitioners relating to directional antennae performance. This writer submitted comments proposing the elimination of field measurement data in favor of *moment method computer analysis*.

The latter method is widely used in the consulting engineering community as a basis for phasor design, an adjustment tool, and array performance verification. Since the moment method can very accurately predict operating characteristics of any number of arbitrary wires (antennas), it is well suited for the task of near field analysis.

While the merits of moment method computer analysis have been explored in the 93-177 proceeding, this writer recommends its use in contour prediction for blanketing interference matters. It is noteworthy that the authors of Mininec Professional [4] are in the process of developing a computer code specifically intended for use in the broadcast community [5]. The code will have the ability to relate a wire's field (i.e. field ratio) directly to voltage and current driving parameters and vice-versa. Currently there is one commercial package [6] that already performs this function. It is suggested that the matter of AM contour determination be postponed until the Mininec Professional code is publicly released. The Commission is urged to contact the authors since they are third parties to the matter (i.e. to the best of this writer's knowledge, neither author is engaged in broadcast consulting engineering). The kernel of the Mininec Professional program differs from that previously employed in earlier versions of Mininec and that employed in some versions of NEC. While a discussion of these differences is well beyond the scope of these comments, it is sufficient to point out that application of new computer methodology will address a number of concerns relating to broadcast antenna systems, near filed calculations being one of them.

The proposed §73.1630(c) contains an amusing reference to *phonographs*. It is doubtful that any phonographs are in manufacture today. Table "A" should contain references to the following consumer items in the "Devices Not Covered" heading:

Garage door openers. Stereophonic amplifier systems. Public address systems.
Home and auto alarms. CATV/MATV amplifiers. Wireless microphones and monitors.
Telephone answering devices and facsimile machines. Wireless data modems.
Electronic test, measuring or monitoring equipment.
The following descriptions should be clarified as follows:
Computers and computer peripherals. Digital or Analog based recorders/players.

The proposed §73.1630(c) also contains reference to "permitees or licensees who...replace their antennas...". An FM station licensee who replaces its antenna should not be bound by the one year requirement since the number of antenna bays, antenna type, or transmitter power is not considered when calculating the blanketing zone for FM stations. Only the ERP is considered, without regard to antenna height above ground or vertical radiation pattern. This requirement would place an undue and unfair burden on FM licensees. In fact, there is an inconsistency in the Commission's rules when relating blanketing interference calculations to RFR calculations. An FM licensee desiring to suppress unwanted downward radiation may opt to employ a $\frac{1}{2}\lambda$ spaced antenna. The radiation immediately below the antenna is considerably suppressed, thus minimizing signal level toward occupied areas i.e. an FM antenna mounted atop a tall building. For blanketing calculations, solely the ERP is considered without regard to vertical radiation characteristics thus penalizing a licensee who wishes to minimize exposure of its signal to personnel or equipment. The same ability to more accurately demonstrate actual signal level should be afforded to FM and TV licensees since these patterns are easily calculated. This would bring the AM, FM and TV rules in closer agreement in light of the fact that the Commission is proposing more involved AM calculations [§73.1630(a)].

The Commission is urged to consider the form of "effective technical assistance" it expects licensees to provide consumers. In many states, technicians who service consumer products are required to be licensed in that state. In Connecticut, for example, there are several grades of licenses for service providers which include TV/radio repairmen and cable television installers. Contract engineers, consulting engineers or station chief operators may hold an FCC license, SBE certification, NARTE certification, etc which do not satisfy the state's licensure requirements. There is also a safety issue. For example, let us assume a home television receiver or VCR can be cured of interference from a nearby broadcast station by grounding its cabinet to a water pipe. Should AC leakage from the consumer device electrify the water pipe due to a mixture of metal and plastic piping (common in some areas) a serious safety issue can arise placing the licensee in a libelous situation. Also, any future unrelated difficulties that may arise with a piece of equipment directly serviced by the station may invite claims of defective workmanship by the consumer i.e. a car owner who just had his muffler replaced now insists his engine, brake, etc problems were caused by the muffler shop.

The Commission appears to be of the opinion that simply referring the consumer to the respective equipment manufacturer for advice is insufficient fulfillment of its responsibility in resolving blanketing interference. The manufacturer, however, is best technically qualified since few, if any, consumer devices are provided with schematic diagrams let alone technical manuals. In some cases, external filters may resolve interference problems. Such filters may be available through a local Radio Shack retailer, directly from the consumer device manufacturer, or through mail order (i.e. single channel trap filters). Providing the consumer with specific information on how to contact the manufacturer and an accurate technical description of the interference problem can often times be quite helpful. In many cases, manufacturers provide filters, etc. at a nominal charge.

The Commission has requested comment on licensee responsibility for transient buildings such as hotels, dormitories, etc. Under the law, there is a "move to the nuisance" clause which clearly applies to these occupants. Very few broadcast facilities are able to be easily masked from the public. It is reasonable to assume, therefore, that moving to close proximity to a broadcast site may invite high signal levels which may overpower certain consumer electronic devices. This is analogous to the reasonable expectation of noise from a nearby race track or odor from a nearby landfill.

The Commission has also requested comments regarding telephones and telephone systems. These devices are now manufactured in digital and analog forms. Telephones are currently categorized under "Devices Not Covered". Telephones are perhaps the most common source of interference complaints. Older telephone sets such as the classic Western Electric 500 series were easily cured of RFI usually by placing a .001µf capacitor across the earpiece terminals. These sets employed a transformer based 'network'. Today's electronic telephones employ a digital or analog based electronic active hybrid 'networks' which are more prone to RFI. All telephone manufacturers closely guard their designs and no manufacturer offers schematic diagrams of its wares to the public. The susceptibility of these telephones and telephone systems to RFI is well documented. Again, the best form of interference resolution lies with the device manufacturers as they are best technically knowledgeable and qualified to deal with the problem. The Commission is also advised to consider that some telephones are interconnected with computer, answering or facsimile devices which may compound interference problems. Telephones and systems should remain as "Devices Not Covered".

If the telephone and telephone system remain categorized as "Devices Not Covered" it should send a strong message to the manufacturing community to design their products to be RFI immune. As the Commission correctly points out, external filters on these products are usually insufficient in themselves to resolve interference. This writer believes that it is technically feasible at negligible cost to manufacture telephone systems that can peacefully coexist in high RF environments.

## References


1 "Electromagnetic Waves and Radiating Systems" Second edition, Prentice-Hall, Edward C. Jordan and Keith G. Balmain. Chapter 10.09, pp 333-338.

2 "Directional Antennas" Proceedings of the IRE, Vol 26, Number 1, Part 1, pp 78-83. George H. Brown.

3 "Field Strength Measurements (540-1600 Khz)", NAB Engineering Handbook, Sixth Edition, Chapter 16, Appendix A, pp 408-409. Adapted by Silliman, Moffet and Rohrer. Vir N. James, PE chapter author.

4 "Mininec Professional for Windows" , EM Scientific, Inc. J.W. Rockway and J.C. Logan.

5 A broadcast version of the above program described to this writer in a private communication.

6 "Phasor Professional", "MMA", "DRIVE", others by Westberg Consulting, Quincy, IL.